

ANABOLIC/REGENERATIVE PHYSIOLOGY IN RELATION TO STRESS AT WORK

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The enormous importance of regeneration is illustrated by the fact that all bodily systems have a constant wear and tear of cells (apoptosis or programmed cell death) so even during a day with no particular events it has been stated that we lose 1.5 kilograms of cells which have to be replaced, for instance white blood cells in the immune system, muscle cells, mucosa cells in the gastrointestinal system, skin cells, cells in the brain's support system. If regeneration is inhibited for several days or weeks without recovery possibilities these systems become fragile and excessively vulnerable to stress. Studies for instance by Kiecolt-Glaser and others have shown that subjects have decreased ability to heal experimentally induced wounds during such periods.

The anabolic functions are to some extent related to the activity in the parasympathetic system(s). During more recent years researchers have discovered that the parasympathetic activity should be followed in psychosocial processes and one of the relatively easily applicable methods for studying this is heart rate variability. High frequency power variations as well as very low frequency variations seem to reflect aspects of the parasympathetic activity which also influence such things as the baroreceptor sensitivity. The baroreceptor activity is of importance to successful blood pressure regulation (ability to switch off blood pressure elevation once a stressor has disappeared for instance) Hormones that reflect anabolism/regeneration are for instance DHEA:s, testosterone and oestrogen. The concentration of testosterone in saliva does not differ so much between men and women and increase in saliva testosterone concentration seems to be useful as a mirror of improved psychosocial conditions in both men and women. An advantage with saliva collection is that several samples may be collected during the day and this decreases the effects of irrelevant temporary phenomena. A recently published study from our group (Theorell et al 2007) illustrates this in two groups of orchestra musicians. In one of them a major threat to the whole orchestra had pronounced psychosocial effects and was mirrored in a depression of saliva testosterone concentration (mean concentration during the wake hours) as well as parasympathetic activity (mean 24 hour) in heart rate variability.

An ongoing study illustrates that a specific group activity (starting to sing in a choir) is associated with increased saliva testosterone concentration – as a possible mirror of increased anabolic activity. A previous study from our group (Theorell et al 1990) showed that in men decreasing job strain was associated with increasing plasma testosterone concentration. Still another study from our group showed that plasma testosterone rises during a beneficial job intervention in women – also as a possible mirror of anabolic activity. In women however, excessively high plasma testosterone concentration could be part of the metabolic syndrome so it is only when variations take place in the normal range that they could be interpreted in relation to psychosocial processes. Another possibility is to study variations in oestrogen concentration in women. For instance a study by our group (Hertting and Theorell 2002) indicated that this is feasible and that a decreased plasma oestrogen concentration was observed one year after a downsizing/re-organisation process started.

Conclusions: The anabolic/regenerative functions are of fundamental importance to our resistance against stress and should be stimulated. Increased emphasis on biological assessments of this is demanded. The HPG axis is quite sensitive to psychosocial processes and could be monitored in relation to psychosocial processes. Longitudinal observations are necessary for meaningful interpretation.

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